

Device and method for springing a vehicle seat

Patent Claims

- 5 1. Spring device for a vehicle seat, in particular a utility vehicle seat having at least one
air spring arranged between a seat part and a lower part for the height adjustment (5) of
the seat part and having a control device for controlling the supply and discharge of at
least one additional air volume to or from the air spring,
c h a r a c t e r i z e d i n t h a t
10 at a selectable run in and/or run out position (8, 9) of the air spring, the additional air
volume that can be supplied or discharged can be changed or switched off by means of
the control device such that inclines in the profile of a force-path air spring characteris-
tic (1; 1a, 1b, 1c) of the air spring in a first and in at least one further range (2, 3, 4) are
different from one another.
- 15 2. Spring device according to Claim 1,
c h a r a c t e r i z e d i n t h a t
in the range (3, 4) of the force-path air spring characteristic (1; 1a, 1b, 1c) the vibra-
tion-damping additional air volume that can be supplied or discharged is greater or
20 smaller than in the first range (2) or is completely switched off.
3. Spring device according to Claim 1,
c h a r a c t e r i z e d i n t h a t
the additional air volume in the further range (3, 4) can be supplied to or discharged
25 from the air spring in each case in a number of stages, preferably in three stages.
4. Spring device according to Claim 1,
c h a r a c t e r i z e d b y
at least one pneumatic directional control valve for supplying/discharging the addi-
30 tional air volume(s).

5. Spring device according to Claim 1,
c h a r a c t e r i z e d b y
an adjustment device for the automatic height adjustment of the seat part at the start of
a use operation by a user having a predefined weight by means of air being supplied to
5 or discharged from the air spring such that the air spring adjusts to a central position
(7) in the first range (2) of the force-path air spring characteristic (1; 1a, 1b, 1c).
6. Spring device according to Claim 5,
c h a r a c t e r i z e d i n t h a t
10 the first adjustment device comprises a regulator switch that is arranged in the region
of the armrest of the vehicle seat.
7. Spring device according to Claim 1,
c h a r a c t e r i z e d i n t h a t
15 the first range (2) within the force-path air spring characteristic (1; 1a, 1b, 1c) can be
displaced by means of an operating device by the user and by means of the control de-
vice such that the seat part is adjusted to the desired height.
8. Spring device according to Claim 1,
20 c h a r a c t e r i z e d b y
a recognition device for recognizing a user using the vehicle seat, in particular by
means of his weight.
9. Spring device according to Claim 1,
25 c h a r a c t e r i z e d i n t h a t
the additional air volume that can be supplied and discharged is greater than 0.1 l in
the first range (2) of the force-path air spring characteristic (1; 1a, 1b, 1c) and is either
0.0 l or greater than 0.0 l in the further range.

10. Spring device according to Claim 1,
c h a r a c t e r i z e d b y
recognition and switching devices (8a, 9a) for recognizing the selectable run in and run
out positions (8, 9) of the air spring and for switching the spring device to supply and
5 discharge the changeable additional air volume by means of the control device.

11. Method of springing a vehicle seat, in particular a utility vehicle seat having at least
one air spring arranged between a seat part and a lower part for the height adjustment
(5) of the seat part and having a control device for controlling the supply and discharge
10 of at least one additional air volume to or from the air spring,
c h a r a c t e r i z e d i n t h a t
when the air spring exceeds a predefinable run in and/or run out position (8, 9), the
additional air volume that can be supplied or discharged is changed or switched off by
means of the control device in order to change in a further range (3, 4) an incline in the
15 profile of a force-path spring characteristic (1; 1a, 1b, 1c) with respect to a first range
(2).

12. Method according to Claim 11,
c h a r a c t e r i z e d i n t h a t
20 the exceeding of the predefined run in and run out position (8, 9) of the air spring is
recognized by means of recognition and switching devices (8a, 9a) and the spring de-
vice is switched by means of the control device to the changeable additional air vol-
ume for the further range (3, 4).

13. Method according to Claim 12,
c h a r a c t e r i z e d i n t h a t
in the event of switching of the spring device, the changeable additional air volume is
supplied to the air spring only when the recognition and switching devices (8a) in a
first end of travel region are activated on account of vibration, regularly and at a high
30 frequency by the air spring moving in and out.

14. Method according to Claim 12,
c h a r a c t e r i z e d i n t h a t

in the event of switching of the spring device, the changeable additional air volume is
discharged from the air spring only when the recognition and switching devices (9a) in
5 a second end of travel region are activated on account of vibration, regularly and at a
high frequency by the air spring moving in and out.

15. Method according to Claim 11,
c h a r a c t e r i z e d i n t h a t

10 in the event of insufficient vibration damping in the end of travel regions of the air
spring with respect to a residual travel path, the changeable additional air volume is
reduced towards one end of travel until a sufficient damping of the air spring is
achieved without touching of the end of travel by an air spring lifting cylinder.